Ms. Ref. No.: GLR-D-15-00174

Title: Effect of net size on estimates of abundance, size, age and sex ratio of Mysis diluviana

Journal of Great Lakes Research

a) outline each change made (point by point) as raised in the reviewer comments

AND/OR

b) provide a suitable rebuttal to each reviewer comment not addressed

To submit your revision, please do the following:

1. Go to: <http://ees.elsevier.com/glr/>

2. Enter your login details

3. Click [Author Login]

This takes you to the Author Main Menu.

4. Click [Submissions Needing Revision]

I look forward to receiving your revised manuscript.

Yours sincerely,

Robert E. Hecky, Ph.D.

Scientific Editorial Office

Journal of Great Lakes Research

Associate Editor:

This is a useful analysis of mysid sampling methods that has implications to Great Lakes and beyond. The paper has received two careful reviews. Both reviewers were generally positive, but have some suggestions for improvements. Both reviewers wanted to know why you did not use a paired t test when comparing the two net types, which given the paired approach to sampling would appear to be the most appropriate method to analyze the data. If you have reasons not to use that approach, please elaborate in your response letter and add a sentence or two to the methods. One reviewer wanted to move Table 1 to an on-line appendix, which you may want to consider. That table is useful so do not delete it. I am not against keeping it in the main body of the paper. There are also mysid sampling with similar methods from marine systems, in particular the Baltic Sea and maybe the Caspian Sea. Those studies could be added, but I will not insist on this as the list is long already.

Another issue to consider is the catch of a few large and small individuals in the larger nets. You should be able to test if that is simply due to the larger sample size obtained in the larger net. You suggest that may be the case.

Finally, the length analysis is using every measured mysids as an independent sampling unit. I think it would be more appropriate to use a paired t test on the mean lengths for that comparison as well, using each net instead of each mysid as the sampling unit. There is always the possibility that different size groups occur in different areas of the reservoir, and therefore that each mysids measured are not independent from the other mysids measured in a given net haul. Please consider that in your response.

Lars

Reviewers' comments:

Reviewer #1: Review of GLR-D-15-00174

This paper compares the results of Mysis sampling in a reservoir using two different sized nets. This is a useful exercise, and I think the results will be a bit surprising to most people. I think a few things could be done to improve the manuscript.

1) Line 37 I'm not sure the mesh size should have this many significant figures?

* We changed mesh sizes to microns

2) Keywords—you never really measured net efficiency, remove as keyword. To do so you would have needed a calibrated flowmeter.

* Removed

3) For easier editing and to follow journal guidelines, the text should be double spaced

* Done

4) Line 48-55 I'm not sure of the relevance of a discussion of the two mysid species?

* We wanted to make it clear since much of the old literature refers to *M. relicta*; in some cases it is now *M diluviana* (NA) or not (Europe).
* We added a sentence to clarify.

5) Throughout—Mysis needs to be italicized, mysids should not be capitalized (unless it starts a sentence)

* Done

6) Line 123 were 20 tows with each net done in July and combined, or were 10 total tows with each net done over two nights?

* fixed

7) Line 124 so a total of 30 paired tows were done?

* Clarified; total of 40 paired tows

8) Line 145, 150 I'm not sure you controlled for these factors, rather it seems like they were factors in the analysis?

9) Line 149 I don't think the mean length is the correct variable of interest. The size distributions could be very different and provide similar mean lengths. Rather, I think an analysis of the size structure is appropriate, perhaps using some sort of contingency table to evaluate the homogeneity of proportions. I also think the analysis of population structure (male-female, juvenile) and male:female ratio would be more appropriately done by testing for homegenity of proportions and then looking at standardized deviation to see where the nets differed (if at all).

10) The analysis of abundance (and other factors) was done basically to see if this study was done with one net or the other, would the results over the reservoir differ. This is an interesting question and an important one to address. But the net tows were done in paired combinations, so there is more information here. I would like to see something like a paired t-test (using each individual set of net tows as a sample), or a regression of values from one net plotted against the other from each sample to see if there was any bias based on the paired tows.

11) Line 163 and 166 I think you mean density and not number?

12) Please provide F values, df so the stats can be evaluated

13) Line 177 also caught more of the smallest individuals

* fixed

14) I think it is important to note in the discussion, mysid numbers were fairly high in this study and all the work was done in the summer. Perhaps these values are not equally valid in isothermal conditions or under low mysid densities. Researchers would not want to switch nets simply based on this information without validating the results to the conditions of their study area.

* Agreed, we added a couple of sentences to make these points.

15) Figure 2 and 3 are in wrong order; please define boxes, lines, points in figure 2

* Sorry, figure files were named wront. Figure 2 is the box plots figure, as cited in text. We added “box and whisker diagrams” to the caption and defined the symbols. We believe readers will know what the box and whiskers represent.

Reviewer #2: This manuscript has one straightforward message that will be useful to researchers interested in the collection of mysids, in that it supports the use of smaller diameter nets, which will be convenient from small vessels often used in lakes these animals have spread into. Overall this manuscript is acceptable for publication with some revisions. The details of the statistical tests need to be expanded upon and some language that downplays some of the size-distribution differences with different net sizes should be discussed in greater detail.

Major points:

1) The manuscript is overcited. Part of this is due to the inclusion of a table which documents previous Mysis study methodology, which is not directly necessary for the manuscript (but still useful) so should be included as an appendix.

* Reduced citations in text to a single source per point in most cases, and eliminated 5 sources from reference list (indeed, many of our references are needed for the Table).

2) The manuscript is short so you have plenty of space to expand upon your statistical methodology which isn't made clear, and your presentation of only p values is insufficient to assess your analysis.

3) "Mysis" is regularly not italicized throughout the manuscript (noted in detailed comments)

* Fixed throughout

4) Downplaying the differences in size-distribution associated with the net sizes doesn't make the paper more persuasive. There are plenty of reasons where researchers may target the tiny fraction of smallest or largest individuals which are being missed by the smaller nets. Discuss this difference and end with the point you make that if possible, use the larger nets, but for most work, the smaller nets are an acceptable substitute.

Detailed comments:

L38 Only 3 dates were sampled.

* Actually 4 dates but results from 2 July dates were pooled. We changed wording to “…three occasions…”

L40 Size structure was slightly different (more at tails of size-distribution for large nets). Without this fact the last sentence of the abstract may not be clear.

* Rewrote this sentence to note difference in sizes sampled

L46 Mysis should be italicized.

* Fixed throughout

L52. In deeper systems, Mysis continue to be pelagic, but simply migrate to deeper zones during the day.

* Reworded this sentence

L48-68. It is nice to see an overview of Mysis, but there are too many citations in this section. One per point is usually sufficient, yet you usually have 2 or sometimes 3. Combine sentences that cite the same source to save space.

* See point #1 above

L71-86. Again, overcited.

* See point #1 above

L80 0.30 m

* done

L83 ranged from

* done

L85 you have citations for ranges of net meshes but just state that 0.5mm is the most common without any citation. Was this from your own investigation (mean of table 1)? If so, don't confuse the mean with the most common - I count 8 of 40 listed with 0.5mm mesh, the same number as with 1.0 mm.

* fixed

L113 Mysis must be italicized. This is done inconsistently in the following pages.

Also: L120, 123, 153. 189, 204, 206, 215, 252, 371

* done

L122 use ind or N rather than lowercase n

* Changed to individuals/m2 throughout

L130 use s or seconds

* fixed

L136 You list 1) 3) 4) 5) … what about 2?

* Whoops. Fixed

L141 Be consistent N/m2, number/m2

* Changed to individuals/m2 throughout

L142-151. You can be more concise here for some content and have to expand on other. You always have the same effects so you don't have to relist them. State the data isn't normal so a negative binomial transformation was used for regression on abundance, sex ratio…etc. See next note regarding statistical methods. You would be better off explaining the rationale for methods and the format in more detail rather than just the factors. For instance there is no detail given on the negative binomial model which can be constructed and assessed in a range of ways (likelihood format, AIC etc). Be descriptive here. If you used a specific stat software package, this would be the place to note it.

L145-148 Why wouldn't you use a paired test? You collected each at the same time, so you could control much of the variability in catch (patchiness) by comparing them to each other (you comment L153-155 on this). Your size data shows multiple cohorts so it isn't surprising that you have non-normal data but the distributions are similar so should be easily discriminated using pairwise testing.

L145 Mysids shouldn't be capitalized.

* fixed

L162-170. You give p values but no specifics as to method. The negative binomial model requires a range of output to assess the fit. The p values by themselves are not necessarily relevant so F (or z) values or r-mean squares should be included as well.

L156. It is unusual for an author to cite unpublished data on their own paper. Ideally, you could easily add an additional graph that shows the series given the few number of tables and figures.

* This citation replaced with original source of data (Martinez et al. 2010).

L161. Are you alluding to a drawback in your methods here given the lack of identification of sex increasing during the study?

* No we were not. The increase in number of unsexed adults is simply because as season progressed juveniles were exceeding the 10 mm threshold, but had not yet begun expressing sexual characteristics. We added this explanation to the paragraph.

L167 Don't repeat yourself. "between net size and sampling date" redundant. Instead, "effect or interactions".

L168 As above, you can include all of these as one statement: "density or juvenile proportion".

L173 "likely not of practical interest".

* fixed

L175. So did you check for homogeneity of variance? A larger range but similar mode suggests that the larger nets had increased variance. This doesn't necessarily affect your results but should be noted. This might be relevant for any attempt at bioenergetics modelling for instance. The quartile plots in Fig. 2 suggest that the smaller net mean lengths are skewed downward (lower quartile larger than upper) which is reversed in the larger nets (except in July, which is more likely driven by the bimodal distribution in this month and suggests (there is no testing?) that the distributions are not normal and means are unlikely to be relevant for this month). You might be better off testing the bimodal distribution as two distributions (mode to mode). This may be a result of the different efficiencies of the two net sizes (you make no note of flowmeter readings and in your next section you calculate efficiency using areal ratio). It also might be worth more text describing the different distributions of %juveniles since the august and September distributions are very different even though their modes are similar (the distribution tail).

L183. "probably not biologically relevant". Since you do not give these distributions (beyond the graphs), this isn't necessarily your call since some researchers may be focused on the very tails of the distribution that you dismiss. Instead, note that they are very small differences in numbers and that researchers interested in these larger individuals may wish to utilize the larger nets.

Instead, move the sentence that is "Thus, these two nets…" up to be the second sentence (you state that there is essentially no difference in their distribution), then follow up with the caveat with respect to the larger size distribution afterwards.

* Agreed, we were too dismissive of size differences. Sentences rewritten.

L187. The slight bias where the smaller nets are missing the largest individuals may by more relevant in late October or November when many programs sample to get egg production rates. Larger individuals appear to be able to avoid the smaller nets (they are certainly more powerful swimmers) and may also detect a difference in the net-mouth "head-wave" if your efficiencies are different.

* Added a caveat to this effect at L228

L192. Efficiency is not simply a matter of the interaction of speed with net construction but also mesh fibre diameter can also change the percent open area of a net. This is why efficiencies are measured directly with flow meters. This isn't a game breaker, but this information is vital to those individuals who sample mysids for research purposes.

* Added fiber diameter to factors affecting efficiency

L203. As noted previously, be careful with your wording. Your equipment is similar to certain studies, but it can just as easily be said that your mesh size (for instance) is smaller than the majority that specifically are used to target mysids. Your comment on the size preventing loss of small mysids may be spurious. Given your distributions (and mean size of ~10mm) did you even see any mysids less than 1 mm in size (or even up to 3 mm)? Fig. 3 suggests you didn't, so you shouldn't expect net extrusion at a 3:1 ratio. If the mesh size was used to be consistent with other monitoring methods, then just state that, which is a perfectly fine reasoning and supported by your results.

* Agreed, sentence deleted.

L214 "Our findings…"

* fixed

L217 "While the larger net captured more…" - you have waited until here to note that there are two possible reasons (increased sampling area or reduced net avoidance). This should be in your first sentence of your discussion since it is the one factor which is clearly different between the sampling methods. Your second point about the large net also catching larger numbers of smaller individuals only suggests a sampling area effect (wording should be "did not support"). Both factors can be happening with the different size animals - larger mature adults are significantly more powerful swimmers than the smaller juveniles. Your last point in this paragraph should be expanded upon to note the comments listed above (that some researchers may be targeting the largest individuals to estimate population growth rates).

* Agree that both factors may be operating. We revised and reorganized the entire Discussion section to address this and the following three points

L229. Remove "Conclusions" - it is the last paragraph anyway.

* done

L230. The term "biologically relevant" is loaded and likely to create disagreement even if there isn't any in the findings. You don't know what is biologically relevant to mysids or to other trophic levels that are affected by them (e.g. large individuals are known to have a significant impact on trophic dynamics beyond just their biomass (a la Fry and Quinones 1994, Ellis et al. 2011) and the presence of mysids will shift size structure of the entire plankton when present. Size is important.

* See response to L217

L236. This sentence essentially repeats the last in the previous paragraph. Combine them and expand on as noted in the L217 comment.

* See response to L217

Table 1: You can save a huge amount of space in your table by just using "Conical" instead of "Conical plankton" and "Pyramid" instead of "Inverted pyramid" on two lines and note in the caption (you should also explain "framed net"). This table can easily be portrait with this change thus freeing up more space. This table is a major source of your extremely large reference section. This would be better suited for a supplementary appendix since it is not directly essential to the finding of this study.

* Reformatted table as suggested and added to the caption. Removed “framed net” study, as net details were not available. I will ask the editor if they prefer this as an appendix

Fig. 1. If you are going to note lat-long lines on your map, you should use a different line marking (e.g. dashed).

* Lat-Lon removed from map to avoid confusion with state boundaries

Fig. 2 and Fig. 3 captions don't match your graphs because the next two figures pages are reversed.

* Sorry, we named the image files incorrectly. Captions are in correct order, figures will be ordered correctly in revision.

Fig. 2. The dots are means and the lines are modes? This isn't made clear. Axes titles may have to be larger.

* Fixed in caption, increased font size on axis titles

Fig. 3 The 1.0 m diameter net bars should be white to be consistent with the other graph. Font may have to be larger for the axes and the inset pie-graphs.

* Colors changed, font sizes increased